Journal of Porphyrins and Phthalocyanines 2017 vol.21 N1, pages 37-47

Symmetrical and difunctional substituted cobalt phthalocyanines with benzoic acids fragments: Synthesis and catalytic activity

Vashurin A., Maizlish V., Kuzmin I., Znoyko S., Morozova A., Razumov M., Koifman O.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017 World Scientific Publishing Company. Difunctional and symmetric phthalonitriles were synthesized by nucleophilic substitution of brome and nitro-group in 4-bromo-5-nitro-phthalonitrile for residues 4-amino-, 4-hydroxyl- and 4-sulfanyl benzoic acid. Symmetrical and difunctional substituted cobalt phthalocyanines were obtained by template synthesis based on mentioned phthalonitriles. Their spectral properties and catalytic activity in aerobic oxidation of sodium N,N-carbomoditiolate were investigated.

http://dx.doi.org/10.1142/S108842461750002X

Keywords

4-bromo-5-nitro-phthalonitrile, benzoic acids, catalysis, cobalt phthalocyanines, oxidation, synthesis

References

[1] Xu H-N, Chen H-J, Zheng B-Y, Zheng Y-Q, Ke M-R and Huang J-D. Ultrasonics Sonochemistry 2015; 22: 125-131.
[2] Alonso L, Sampaio RN, Souza TFM, Silva RC, Neto NMB, Ribeiro AO, Alonso A and Gonçalves PJ. J. Photochem. Photobiol. B: Biol. 2016; 161: 100-107.
[3] Zorlu Y, Dumoulin F, Bouchu D, Ahsen V and Lafont D. Tetrahedron Letters 2010; 51: 6615-6618.
[4] Saka ET and Biyiklioglu Z. J. Organomet. Chem. 2013; 745-746: 50-56.
[5] Gmurek M, Bizukojc M, Mosinger J and Ledakowicz S. Catalysis Today 2015; 240: 160-167.
[6] Saka ET, Gonca C, Sarki G and Kantekin H. J. Incl. Phenom. Macrocycl. Chem. 2016; 85: 161-168.
[7] Agboola B, Ozoemena KI and Nyokong T. J. Mol. Cat. A: Chem. 2005; 227: 209-216.
[8] Rashidi AM, Mirzaeian M and Khodabakhshi S. J. Nat. Gas Sci. Eng. 2015; 25: 103-109.
[9] Tarasyuk IA, Kuzmin IA, Marfin YS, Vashurin AS, Voronina AA and Rumyantsev EV. Synthetic Metals 2016; 217: 189-196.
[10] Ogbodu OR and Nyokong T. Polyhedron 2015; 90: 175-182.
[11] da Silva TH, de Souza TFM, Ribeiro AO, Ciuffi KJ, Nassar EJ, Silva MLA, de Faria EH and Calefi PS. Dyes Pigm. 2014; 100: 17-23.
[12] Mashazi PN, Westbroek P, Ozoemena KI and Nyokong T. Electrochim Acta 2007; 53: 1858-1869.
[13] Buck T, Wöhrle D, Schulz-Ekloff G and Andreev A. J. Mol. Cat. 1991; 70: 259-268.
[14] Mack J and Kobayashi N. Chem. Rev. 2011; 111: 281-321.
[15] Nombona N, Antunes E and Nyokong T. Dyes Pigm. 2010; 86: 68-73.
[16] Choi Ch-F, Tsang P-T, Huang J-D, Chan EYM, Ko W-H, Fong W-P and Ng DKP. Chem. Commun. 2004; 2236-2237.

[17] Makarov SG, Kazarin AS, Suvorova ON, Zabrodina GS, Lopatin MA, Kuznetsova OV, Ketkov SYu and Wöhrle D. Macroheterocycles 2016; 9: 180-185.

[18] Ikeuchi T, Nomoto H, Masaki N, Griffith MJ, Mori SH and Kimura M. Chem. Commun. 2014; 50: 1941-1943.

[19] Tekdase DA, Gurek AG and Ahsen V. J. Porphyrins Phthalocyanines 2014; 18: 899-908.

[20] Dyer JR. Applications of Absorphion Spectroscopy of Organic Compounds, London: Prentice-Hall International Inc., 1965.

[21] Handbook of Porphyrin Science: NMR and EPR Techniques, Vol. 6, Kadish KM, Smith KM and Guilard R. (Eds.) World Scientific: Singapore, 2010.

[22] Vashurin A, Maizlish V, Pukhovskaya S, Voronina A, Kuzmin A, Futerman A, Golubchikov O and Koifman O. J. Porphyrins Phthalocyanines 2015; 19: 573-581.

[23] Vashurin A, Kuzmin I, Mayzlish V, Razumov M, Golubchikov O and Koifman O. J. Serb. Chem. Soc. 2016; 81: 1025-1036.

[24] Vashurin AS, Pukhovskaya SG, Semeikin AS and Golubchikov OA. Macroheterocycles 2012; 5: 72-75.

[25] Tyapochkin EM and Kozliak EI. J. Mol. Cat. A: Chem. 2003; 203: 37-51.

[26] Tyapochkin EM and Kozliak EI. J. Mol. Cat. A: Chem. 2005; 242: 1-17.

[27] Vashurin A, Filippova A, Znoyko S, Voronina A, Lefedova O, Kuzmin I, Maizlish V and Koifman O. J. Porphyrins Phthalocyanines 2015; 19: 983-996.

[28] Dubrovina AS, Malkova AI, Artem'eva LM, and Tupikov VI. Russ. J. Phys. Chem. 1988; 62: 1904-1908.

[29] Berezin BD. Coordination Compounds of Porphy-rins and Phthalocyanines, Wiley: New York, Toronto, 1981.

[30] Dolanský J, Wagnerová DM and Veprek-Šiška J. Collect. Czech. Chem. Commun. 1976; 41: 2326-2332.

[31] Shishkina OV, Maizlish VE, Shaposhnikov GP, Lyubimtsev AV, Smirnov RP and Baran'ski A. Russ. J. Gen. Chem. 1997; 67: 789-792.

[32] Marko L and Marko-Monostory B. In Organic Chemistry of Iron, Complexes with sulphur-containing ligands, Koerner Von Gustorf EA. (Ed.) Academic Press Inc.: New York, 1981; pp. 283-332.

[33] Vashurin AS, Kuzmin IA, Litova NA, Petrov OA, Pukhovskaya SG and Golubchikov OA. Russ. J. Phys. Chem. A 2014; 88: 2064-2067.